precipitate attacks in individuals sufficiently susceptible. However, Dr. Gould's brilliant record is entitled to serious consideration, for there is none that in any degree compares with it, and that the large majority of cases have their exciting cause in the eyes is the consensus of opinion at the present time. Often the removal of the exciting cause alone results in a cure, and when the nervous or psychic condition is or can be rendered normal, no amount of irritation will precipitate an attack; so if both the neurologist and oculist would extend their horizons and recognize this fact, their records of cures would be markedly increased, and results accomplished that are now impossible.

Cures are not as a rule immediate, but require great patience and skill, for lifetime habits of nerves and eyes do not yield graciously to any corrective effort, and often we must be content with a mitigation of the severity and the extension of the interval.

The significance of persistent headache lies in the fact that it possesses a causative factor that is frequently of such a nature as not only to render the patient miserable, but to threaten life itself.

Headache, moreover, is often the only symptom prominent, while other morbid phenomena are obscure—it thus acquires in doubtful cases diagnostic value often of a high degree.

Again, it is a symptom of many diverse conditions —its pathology is multiform—its etiology varied and irregular. It is only a symptom and often one of many that make up the morbid complexus and its cure as a consequence is often difficult.

THE MEDICAL SIDE OF HEADACHE.*

By J. WILSON SHIELS, M. D., San Francisco.

All headaches are complex and obscure. We have little exact knowledge of the structures wherein pain is felt. We do not know what pain really is. Clinically we desire to believe that the consciousness of pain must be related to the activities of certain nerve cells in the cortex. And that these cortical cells are reached by currents of overflow from other sense centres when the violence of their inner excitement surpasses a certain pitch; and they, in their turn, are concerned in receiving impressions from nerve fibres by which the sensory impulses pass from the part or parts complained of. Indeed there is no good reason why these lower sense centres should not also be considered pain centres when they have reached a point previous to the overflow of their inner excitement.

Wise men specializing in physiological investigation refute much of this. In fact they seem to take a particular pleasure in trying to prove our clinical findings faulty, and this continual refutation leaves us in a wilderness of ignorance crying aloud "What is pain?" "What is its relation to other forms of sensation?" "Is it the product of a special sense?" The physiological echo answers "Is it?"

Again we implore "May it not be inherent to, and appear in any of the known separate senses?" Again the scientific answer, "May it not?" And so, in the effort to be of service to suffering humanity, we pin our faith to clinical observation and to pathology; stating, as we do so, that however learned the physiologist may be, he must necessarily be gravely handicapped; for he must rely upon signs born of subjective conditions rather than upon intelligent verbal communication and he will pardon us if we look for a fuller advantage from clinical pathology.

We know that moderate pressure registers touch, extreme pressure pain. The pain produced in a limb is very surely conveyed to the cortical cells related to that limb, and in the habit of receiving impressions from it. By many other familiar facts are we justified in regarding pain as an excessive stimulation, or reaction, of the tactural and other species of cutaneous sense.

Now the brain substance itself is no doubt represented by cortical cells in the same way, yet under normal conditions we know it to be destitute of sensibility; just as we know that all tissues and organs supplied by the autonomic system are not endowed with sensation in the same light with which this term is used when applied to tissues supplied by the cerebro-spinal system. But we also know that any of these organs—heart, stomach, bowels, liver, kidney,—may, when disordered, produce the very ecstasy of pain. This being the case why should it not be that any part of the brain when actively inflamed and producing intense pain, should have that pain sent by, afferent fibres to those cortical cells which are in health related to, and receive impressions from it? This hypothesis we also apply to actively disordered membranes, which, by the by, seems to be the common point of attack of all reflexes, and to bone, for we know that both are possessed of sensory fibres which when irritated produce pain, referred to, and perceived by, those cortical cells receiving normal impressions from them. The clinical truth of this is seen when many a deeply centered lesion, say of the central ganglia, coming nowhere near the brain's surface, is associated with acute headache, and if further proof of this separate representation in the cortex be desired we recall the fact that sympathetic fibres follow the arteries into the brain substance; that the cortex at all times influences the state of these arteries; that this association must mean a very close relationship between the cortical cells and the vaso-motor centres, and that a hyperemia, active or passive, will, by increasing intracranial pressure, so excite them that severe pain will result. Or if you like it better, for we cannot always give the reason why the cortical cells take on an overaction during hyperemia, that they are susceptible to spontaneous overaction consequent upon increased blood supply, and that this spontaneous overaction is synonymous with pain. Daily evidence of this is given us in brain tumors where the most modest cough, or the slightest stoop will add the very extremity of pain to an already unbearable agony.

So it would seem that headache in no way differs from the production and perception of pain in other organs, or tissues. It is a reflex phenomenon the out-

* Read before the San Francisco County Medical Society, May, 1909.

come of functional or organic disorder; the seat of its origin need not be the locality where it is felt, but in the peripheral territory of the sensory fibres associated with cortical or nuclear cells acting as pain centres by virtue of their overexcitement. The various states of cerebral vascular tone producing a resultant increase or decrease of intracranial pressure becomes one of the most, if not the most, important factor in its production. If we could (by our present clinical methods) always gauge intracranial pressure from general blood pressure we would frequently be in a position to explain many a headache, toxic or otherwise, and follow that explanation by rational therapeutic measures. But we cannot do this, so after all, when all is said and done, headache remains a mystery, a poor index to the diagnosis of material and immaterial lesions or conditions of the human body.

Classification and Cause of Headache. When one realizes that any pain in the head may be called a headache, that on the one hand it may be so transient and mild, and on the other so persistent and severe, as to cause the patient either to ignore or to crave relief, one feels the hopelessness of classification. Nevertheless I have endeavored to do so, and here present you with the result of that endeavor. Kindly accept it in the spirit that it is presented. There is nothing didactic in my intention. Time is short and any one of us could dilate for an hour on a division of this arrangement. It is far from perfect and overlaps continuously, and in presenting it I find myself in great fear of being misunderstood. I mean no insult to the intelligence of this audience for without a doubt the causes of headache are well known to you all; but what to say, and what to leave unsaid, has been a continual source of worry and alarm to me. Your very learned and most capable committee have commanded me to write upon the medical side of headache and I am given twenty minutes to do it in, and in my poor effort to do the subject justice I have been forced into presenting this classification. I repeat that I am possessed with its imperfections for although it seems worthy in my mind it looks unworthy on paper. This unworthiness is accentuated by the necessity of placing certain headaches under all the headings. If it will serve as a good working basis for therapeutic considerations and as a syllabus to this paper it will have fulfilled a purpose.

CLASSIFICATION AND CAUSE OF HEADACHE.

I. FUNCTIONAL HEADACHE.

A. TOXAEMIC HEADACHES.

(1) Acute.

(1) Specific infectious (fevers) frontal or general, seldom vertical or one sided. Increased by congestion.
(2) Acute nephritis (following the above) acute uraemia.
(3) Acute composite diabetes (autointoxication with acetone bodies).
(4) Puerperal states other than nephritic failure, preseptic.
(5) Acute drug poisoning, e. g., amyl nitrite, nitroglycerin, etc.

(2) Chronic (Including products of defection metabolism).

(1) Kidney headache. From slight neuralgic type to severe with high grade arteriosclerosis. D.D. when severe with alb. neuritis from cerebral tumor.
(2) Gouty headaches. May be a severe "plus tension" headache or mild "minus tension" headache.
(3) Malarial headache, neuralgic in type, "brow ague." Short intermissions.
(4) Rheumatic headaches common in childhood and associated with "school pressure." Frontal.
(5) Syphilitic.
(6) Sluggish liver headache associated with constipation.
(7) Cirrhotic liver headache (more complicated than No. 6).
(8) Constipation headache, without liver associations. (Also reflex.)
(9) Intestinal dyspepsia headache, with or without constipation. (Also reflex.)
(10) Gastric dyspepsia. (Also reflex.)
(11) Gluttony of fats, proteids, or carbohydrates, i. e., acid products.
(12) Slow drug poisoning, e. g., arsenic, lead, etc.
(13) Noxious air, etc.

B. NEUROPATHIC.

(1) Emotions and other psychic faults. (Hyperaemic.)
(2) Migraine (typical), two types, tonic or paralytic, but generally combination.
(3) Recurrent or periodic headache without visual phenomenon.
(4) Simple neurasthenic headache. (Not sharply defined, "Cephalic sensation.")
(5) Traumatic neurasthenic headache. (Generally sharply defined.)
(6) Epileptic with or without fit.
(7) "School pressure" headache.
(8) Premenstrual headache other than migraine.

C. REFLEX.

(1) Errors and disorders of eye, ear, nose, throat and mouth. (When recurrent usually neuropathic, frontal sinus.)
(2) Gastric, including hunger and fasting, hyperaesthesic, scalp areas, temporal and parietal (D7 and D8).
(3) Thoracic and hyperaesthesic; scalp area, midorbital and fronto temporal (D4 to D7).
(4) Abdominal and hyperaesthesic skin areas, occipital, parietal, vertical and temporal (D7 to D10).
(5) Migraine (anaemic and hyperaemic).
(6) Periodic other than migrainous.

II. ORGANIC.

(1) Inflammations within:
Encephalitis, local or diffuse from any cause. (This includes many of the above.) Lepto and pachymeningitis.
(2) Inflammations without:
Sinus disease.
Bone disease (including middle ear, syphilis, etc.).
(3) Arterial degeneration (see chronic toxic headaches).
(4) Tumors (including syphilis, tubecular cysts, etc.), severe, dull or acute, constant with paroxysmal attacks. No definite position unless superficial, preventing sleep. Intracranial pressure augments, vertigo, optic neuritis, etc.
(5) Indurative (see toxic).

III. CIRCULATORY.

A. ANAEMIC, slowly produced; majority "minus tension" headaches; controlled by position and alcohol.
   (1) Systemic (convalescence).
   (2) Blood dyscrasias.
   (3) Cardiac debility.
   (4) Consequent upon pressure.
   (5) Consequent upon spasm.

B. HYPERAEMIC, majority "plus tension."
   (1) Heart hurry (exophthalmic goitre, etc.).
   (2) Cold, etc. (peripheral spasm).
   (3) Drugs, nitroglycerin, etc.
   (4) Sunstroke (excessive heat, alcohol, anger).

C. PASSIVE CONGESTION, "mechanical headaches."
   (1) Mitral and other head lesions.
   (2) Mediastinai tumor.
   (3) Persistent cough.
   (4) Faulty attitude in sleep.
   (5) Collar restrictions, etc.

Before enlarging upon this arrangement allow me a few general remarks. There are few well defined beginnings of headache. When one is searching for the indefinite one must be prepared to fail to follow and obey that very easy-to-write-book-axiom "Find the cause and remove it." We have not the same difficulty in finding the exciting cause. In headache it is the vague causative something that must be found and removed. Do not misunderstand me. The removal of the exciting cause is all important, but my personal observation has taught me to beware of the underlying nerve diathesis in all chronic recurrent headaches and to appreciate that no cure is complete without an attempt either to remove or control it. For example the correction of a visual error will banish the acuteness of the headpain like snow in summer sun, and the physician may rest content instead of continuing his treatment in the hope of alleviating the underlying neurosis and at the same time warning the patient to avoid other exciting headache causes. I have over and over again seen and known of such patients who have had a return of periodic headache with an exciting cause of intestinal origin. In other words a neuropathic diathesis underlies chronic headache whatever the exciting cause may be, and the more marked the history of this taint the less necessary or mild need be the excitement.

I do not agree with the medical men of consequence who consider a classification based upon the period of life as useful. Nor do I think it wise to arrange headaches according to the position of pain. Too many diagnostic errors are consequent upon such a method. Again I am antagonistic to the use of such terms as paroxysmal, toxic, and periodic in classification, for nearly all paroxysmal and periodic headaches are toxic in character. One hears the expressions deep and superficial applied to headaches. I object to such an arrangement. It is lop-sided. The majority of headaches are complained of as deep, whether the cause be deep or not. The only advantage gained is to emphasize those diffuse surface headaches, not reflex, where the pain and hyperesthesia do not follow any anatomical nerve area and therefore not having their origin either in the nerve or its nucleus, must rather have this in the higher centres where superficial pain is perceived. Such patients frequently use the same expression as reflex ones "When I brush my hair I can't bear the pain." The division of headaches into curable and uncurable is most fascinating and the more I live and try to learn the more I find myself drawn irresistibly towards this frank disposal of the whole subject. You will notice that in the classification that I am about to follow I have used the terms plus tension and minus tension headaches, and just so long as one does not forget the grave lesions capable of causing such pressure changes they might be used alone, arranging all headaches under one or other heading. This would lead to good therapy at least.

You will notice that the toxemic headaches are divided into two great sub-divisions, acute and chronic. Under the former are mentioned all pyrexial states and those rapid poison affairs such as diabetes of an acute composite character. This is done with intent, to mark the God sent message of warning and command to attack and control, if not abort the coma so frequently ushered in by headache in this disease. For the same reason I have mentioned the pre-septic headache in the puerperium. A slight headache and a rapid pulse in all toxemias should call for active measures. I have not placed acute alcoholic poisoning under this heading for as a rule no one so suffers. It is generally the morning after. The insidious slight headaches of chronic Bright's disease have been the cause of many a medical man's undoing. Over and over again the diagnosis has been made by the oculist after the patient has been knocked from medical-pillar to medical-post. Every one examines the urine, but the majority are after albumen and not casts or specific gravity, and they are generally satisfied with one examination. Of course they know better. We all know how frequently a urine fools us. I have seen a specimen of urine give no trace of albumen and only a stray cast here and there, two or three days before the patient entered his long last uraemic sleep. So the axiom should be, "In long continued headaches, test and retest the urine."

The headaches of gout are better known to the British graduate than the American and I grant you that the former is obsessed with the gout diagnostic habit; but he sometimes hits the nail on the head. The malarial headache should always be kept in mind especially during influenzal epidemics. It is very neuralgic in type and is frequently overlooked. A blood examination in all neuralgic headaches may lead to a very happy result; if you don't find malaria you may find anemia, both of which amend rapidly to treatment. A rheumatic origin to the headaches of childhood should always be kept in mind. When a "school pressure headache" fails to respond to visual correction, fresh air, iron, and rest, look for a rheumatic taint.

The man who ignores a syphilitic headache, however slight, should be sued for malpractice. It is absolutely criminal on his part. Headache is the most constant premonitory sign of brain syphilis; all others pale before its importance. Although the severest forms may lead to nothing, the mildest may

herald the approach of a grave intracranial lesion. As I have told you to think of Bright's disease when confronted with a headache that has resisted treatment so I tell you to think of syphilis. Therefore the axiom would better read "In all chronic headaches test and retest the urine thinking all the while of syphilis."

One is confronted nowadays with many sluggish livers and when linked with constipation they are frequently associated with recurrent headaches wrongly diagnosed as migraine. Such cases seldom have a neurotic history, and as a rule they increase in severity as age advances. They do not complain of visual phenomena nor is the pulse of high tension, and the relief gained from chologogues and salines is vastly more immediate than from coal tar and bromide preparations.

Notice is taken of cirrhotic liver headache for the reason that I have quite recently been greatly exercised over such a case. The head distress was profound and persistent. I question the advisability of placing it under this division for I have seen many a case of cirrhotic liver without headache. In the one that I have mentioned there was quite a high blood pressure no doubt toxic in origin.

Constipation headaches are seldom missed. The average physician worships at the shrine of the old adage "keep the bowels open and the mind easy" and again the patient will diagnose this for you. I have known cases with the gift of prophesy in this regard. They could foretell the coming of their autointoxication by the odor and character of the stool. A horoscopic stool, to say the least of it, is clinically interesting.

Gastro-intestinal headaches show up painfully the fallacy of classification for although toxemia plays an important causative role, many a nerveless man, filled to overflowing with putrefactive toxins, has passed smilingly through life without suffering a headache, while your gentle temperamental neurotic responds with agony to a minimum dose. The viscero-sensory reflex is indeed a mystery. Yet it is always wise to search for indican increase in the urine of those suffering from vague headaches, the presence of which would, in a measure, justify the control of those foodstuffs calculated to bring about putrefactive change. But here again we are confronted with an old saying "One man's food is another man's poison." What a wonderful advance in therapy would result if men would stop writing diet lists, out of diet books for dietic people, and take their line of action from this old adage.

The neuropathic headaches would alone exhaust the time of this paper. I have already laid stress upon the predisposing strength of neurosis in headache and I do not intend to rehash the signs and symptoms of migraine; all I desire to say is that typical migraine is much more neuropathic than reflex. There never was a true migraine without a neurosis behind it. Hunt long enough and you will find it. If it is only asthma, it is there. Its close analogy to epilepsy is the keynote to its phophylaxsis and proper treatment. Rid an environment of epileptic excitants and you will have migrainous attacks few and far between. Make a point of having your patients write out in their own words an attack and this truth will be vividly brought home to you. Here is one taken at random from my case records:

"My first intimation of a headache is that I see only half of an object. For instance, I may be looking at a face and suddenly the right side of the face is blotted out. I focus again and the left side of the face is blotted out, the right side coming into sight. This is followed by a tightness of the head as though iron bands were arranged Greek-fashion, beginning at the hinges of my jaw and extending over my head and under my head, through the throat and ligaments of my tongue. These bands are tightened and loosened seemingly by something at the hinges of my jaw, throbbing as with the beat of the heart. Then in the cords of the back of the neck comes the worst pain of all—more like a rheumatic pain—which makes you feel that you cannot hold up your head—yet when you lay it down the throbbing of the bands becomes more intense. I have burned my neck and the back of my head severely without realizing I was so doing. My neck, cheeks and ears are very cold; I am chilly and can only find partial relief in placing two hot bottles about my head and one at my feet—then lie down, well covered, for from four to eight hours.

My first sense of relief is the relapsing of the bands—then the pain at the back of the neck becomes less and less until I only have a tired feeling there, that I have felt on some occasions for a whole day after, though really not having pain.

My father suffered from these headaches; my oldest sister developed them at the age of eighteen and sometimes has them for five days without cessation. My second sister developed hers in her thirtieth year and I had my first one in my thirty-first year. We all suffer from cold extremities."

There can be little doubt that this patient suffered a spasm of her posterior cerebral artery, causing an anemia of its territory wherein lies the ½ vision centre and producing a true visual aura; the spasm being followed by a vascular engorgement producing the headache. One must admit that many recurrent headaches are not truly migrainous but at the same time have an analogous pathology to reflex epilepsy.

I have known a patient greatly relieved by the breaking down of pelvic adhesions. The operation was not done for this; I confess that I am not heroic enough to advise such a measure, but it came along as a justifiable procedure for the cure of other conditions. All I know is that the patient's headaches were cured for a long period of time.

We have at times been deeply interested in the cephalic sensations of neurasthenia, and however glibly we may use the term we have often been diagnostically puzzled by the sharply defined vertical and superior-curved-line headaches of these unfortunate people.

The epileptic headaches are too common for words and I have already enlarged upon "school pressure" headaches.

You will notice that I have placed the pre-menstrual headaches under the neuropathic division. There are no scalp areas associated with pelvic organs and if you are not satisfied with this such headaches are more hyperemic or congestive than reflex. At the beginning of this division you will observe that I have coined the term psychic faults. By this I desire to enclose all sexual and other neurasthenias so pitifully common in our practice. A detailed account of them is at all times delicate and frequently out of place. There are no drugs of consequence to be used in such conditions. Our schools do not teach us mental therapeutics and therefore our only hope of service lies in the endeavor to build a column of moral health upon a foundation of self-respect, true love, and religion.

The organic and circulatory headaches are self-evident. We cannot give them the time they deserve. I call your attention to indurative headaches which have been lately enlarged upon. A strange word comes before our notice during our reading and from that time on we meet it daily and wonder why we have never noticed it before. So it is with new clinical entities. We should therefore make ourselves familiar with this form and we no doubt will be surprised with the amount of material we will find to add to the better appreciation of this form of interesting headache.

Diagnosis. Such a thing as a positive diagnosis of the cause of headache is impossible. We must place the word provisional before all findings upon this subject. Unless a man can see with his eyes, feel with his hands, hear with his ears he cannot make a positive diagnosis in pure internal medicine. And to make even a provisional diagnosis of headache the case must be worked out to the last ditch. Throughout the telling of your patient's story you should study his psychology keeping in mind all the time that your chronic headache person has seen many doctors and this experience had no doubt developed his imagination and his vocabulary. Should you see him during an attack you should remember that pain is a very heavy traffic on a nerve fibre and that its impressions are summed up with great ease to the very height of agony; and that the severity of this summation of stimuli should be discounted in all highly strung neurotic people. If you find him walking about remember that the greater the pain the greater the prostration. Given two men with the same amount of headache say for five hours you will find one raving around like a mad thing, the other sullen but sensible. In other words don't be misled by temperament. Try not to over—or under—estimate subjective states by objective signs.

Pay particular attention to the position of your patient. If you find him all flexed-up in bed he is suffering intensely. Remember that a sitting position creates a greater blood pressure than a standing one, and a lying down one greater than a sitting one. You will therefore generally find an anemic headache either sitting or lying down and when you ask him to stand up his pain will increase and he will immediately seek the chair or bed again. Should such a patient be in agony you will frequently find him on his hands and knees and his head buried in the pillows. On the other hand a congestive headache desires to stand supported or be propped up with pillows. Then again there are the positions of head and body in cerebral tumor all well known to you.

Don't let the books fool you. They flatter migraine when they say it is a malady of clever people; I have seen many a stupid person so suffer. Make diagnostic capital by your therapeutic mistakes. If you have given, say ergot one day and your patient returns complaining give him nitroglycerin the next. This is quite honest. No one can truly tell the intracranial pressure from the radial or other pulse. I have seen pale-faced people do better on ergot than nitrites.

Note the effect of percussion and pressure and the maximal point of both and then discount it. If you have ever suffered an acute headache you are in a position to very forcefully state your opinion of the medical man who hammers your head in the effort to diagnose your condition. Note the position of pain, whether it be vertical, frontal, parietal or what not, and then discourage the tendency to diagnose from such findings. Suppose a patient has an intra-cranial tumor and you see him comparatively well on with this lesion. He has up to the time of your examination suffered only general symptoms—headache, vomiting, vertigo, optic changes—and then appear what might be called late local signs. Realize that they may be false localizing signs on account of the relative frequency with which local signs are due to meningitis, hydrocephalus, local spreading of inflammation of the brain substance, edema, etc. Again, true localizing signs at one time present may later become concealed or undemonstrable owing to the development of other signs and therefore if a case comes under observation late however many the signs may be it becomes well nigh impossible to diagnose the site of the tumor.

Doctor Franklin no doubt considers Desdemona a fine diagnostician for she answered Othello when he said "I have a pain upon my forehead" with "Faith that's from watching."

Doctor Franklin will also tell you all about truly reflex headaches and the necessity of careful examination of all the special senses. The classic case that had here hemicrania first on one side and then on the other and was found to be possessed of a bad tooth on one side and a visual error on the other keeps me at all times alert to this necessity. When one realizes that there are cases of brain trouble on record that only showed bodily pain and no headache for example, "tearing pain of half the body with motor weakness—lesion the external nucleus of the thalamus." "Severe right sided body pain for years with right sided motor weakness with involuntary movements of right hand and leg, only slight hyperesthesia and tactural localization, temperature and muscle senses all unimpaired, lesion a pea-sized cyst middle and posterior third of left thalamus," one then knows the hopelessness of definite diagnosis in neurology. It would be utterly impossible for

any man to take up each and every disease mentioned in this paper and give each its diagnostic points.

The family history of all chronic headaches must be worked out with an ability of a Sherlock Holmes. Always start the physical examination with the system you consider most likely *not* to be at fault and you will be surprised to find how frequently you have been in error.

Be particularly careful with hyperesthetic, hyperalgesic and hyper-thermo-esthesic areas. Map them out with exactitude and refer them to their appropriate spinal segments. Use the ophthalmoscope as you would the stethoscope in carditis or the laryngoscope in laryngitis or the knife in surgery. But this must suffice.

Treatment. Remove the cause if you can. I never felt so grateful to a sentence before. It cuts the subject matter of this heading in half. Pardon me if I cut it still more with short therapeutic axioms.

1. A headache in acute composite diabetes calls for an increase in carbohydrates, huge doses of alkalies and a daily estimation of the acetone bodies and ammonia in the urine.

2. In all specific infectious fevers, increase the heat loss, diminish the heat production, and control the heat regulating center by attacking the toxemia.

3. A severe headache controls if not stops the secretion and absorption of the stomach. Therefore when magic coal tar remedies are given at the height of the pain they are of little use, and this accounts for their negative and positive action. A hypodermic of morphine is the only sure method under such circumstances.

4. As a rule all bromides are given in too small a dose.

5. The headaches of gout frequently disappear during pyrexia. The same applies frequently to tuberculosis.

6. The seton of old had its value in causing temperature and counter-irritation.

7. Nitroglycerin is useful in all plus tension headaches.

8. Ergot is useful in all congestive headaches.

9. Gouty headaches are best treated by sodium salicylate in large doses, vegetables and alkalies.

10. Aromatic spirits of ammonia is the best alkali in acid dyspepsia headaches.

11. The sipping of cold water will give transient relief in minus tension headaches. It raises the blood pressure.

12. All low pressure headaches are relieved by cardiac stimulants—caffein, aromatic spirits of ammonia, etc.

13. The headaches of old age are best treated by epsom salts.

14. Headaches with heart hurry are very frequently relieved by drinking strong tea. Caffein is the best minus tension headache cure we have.

15. Ammonium chlorid should always be given very well diluted.

16. Alkalies hold an important place in all headache mixtures.

17. High grades of arterio-sclerosis increase the severity of all headaches, whatever their cause may be; therefore treat with iodid of potassium between the attacks.

18. Treat all neuropathic headaches as you would epilepsy.

THE EYE AS A CAUSATIVE FACTOR IN CHRONIC HEADACHES WITH REFERENCE TO THE EAR, NOSE AND THROAT.*

By WALTER SCOTT FRANKLIN, M. D., San Francisco.

To modern ophthalmology belongs the achievement of recognizing reflex results of eye strain and connecting the visual apparatus with the body in general. Asthenopia was described in the seventeenth and eighteenth centuries, but the underlying cause, the refractive error, was not recognized and the condition went unrelieved. Donders of Utrecht, in his "Anomalies of Refraction and Accommodation" paved the way in 1858 and the application of retinoscopy furthered our knowledge of the subject. The earlier writers also recognized a true squint and conditions where the eyes were generally not straight, but an insufficiency of the muscles, a tendency of the eyes to turn either in or out, up or down, was not known. To von Graefe belongs the renown of calling attention to this subject.

Errors of refraction were recognized by the Greeks and Egyptians, but only as regards diminished vision. Numerous references to lenses are in the early writings and in the days of Rome, Cæsar is reputed as having viewed the arena through a crystal.

American and English writers deserve a large part of the credit for having connected refractive errors with reflex neuroses, and Dr. William Thompson in 1879, in a paper entitled, "Astigmatism as a Cause for Persistent Headache and Other Nervous Symptoms," applied the physiological teachings of Donders in an attempt to rectify these obscure cases of headache by the correction of ocular errors.

S. Weir Mitchell, in the early seventies, stirred the profession by his writings on this subject, and one may look upon that date as the beginning of a plethora of papers regarding eye strain.

To-day it is universally admitted that in all cases of chronic headache where the etiological factor of the same has not been brought out, the state of the refraction and muscular balance of the eyes should be inquired into. The mistake is made in medicine, as in other walks of life, of underestimating causative factors that may be in the minority. Unfortunately the refraction as a cause of headaches has been too highly exploited, with the result that some practitioners have looked for a cure of this condition in a large number of cases that were without the category. This gave a small percentage of successes,

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